

# Screening Process to Determine Potential Radioisotopic Thermoelectric Generator Storage Sites Requiring NEPA Evaluation

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## Introduction

The Off-Site Source Recovery Project (OSRP) was initiated by the Department of Energy (DOE) to fulfill the Department's obligation under the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Public Law 99-240), to accept and manage sources and devices which exceed the Nuclear Regulatory Commission's (NRC) limits for Class C low-level radioactive waste (LLW). Approximately 5500 Greater Than Class C (GTCC) sealed sources have been identified as excess by their current owners.<sup>1</sup> A subset of this total are radioisotopic thermoelectric generators (RTGs) that utilize the heat from a strontium-90 (Sr-90) source to produce electricity. There are currently 46 Sr-90 RTGs stored at various sites across the country.<sup>2</sup>

In order to fulfill its obligations under Public Law 99-240, the OSRP will accept the RTGs and store them until disposal is available. The National Environmental Policy Act (NEPA) process will be used to identify a suitable storage site.<sup>3</sup> This paper defines screening criteria that can be applied to produce a short list of potential RTG storage sites that would require further evaluation using the NEPA process to determine the preferred option(s).

### **Evaluation Criterion #1: Only sites that currently store, generate, or are expected to generate LLW will be considered.**

DOE manages radioactive waste under its control in accordance with DOE Order 435.1, *Radioactive Waste Management*, and DOE M 435.1-1, *Radioactive Waste Management Manual*. When declared excess, the Sr-90 RTGs would become low-level waste (LLW). However, the radioactive content of each RTG exceeds the Class C limits for Sr-90 (7000 Ci/m<sup>3</sup>) defined in 10 CFR 61.55 for LLW. Thus, excess Sr-90 RTGs are designated as GTCC LLW. Requirements for management of GTCC LLW are discussed in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*.<sup>4</sup> Since they are LLW, the RTGs need to be stored in a LLW management facility.

This evaluation criterion eliminates further consideration of sites that do not currently store, generate, or are projected to generate LLW. In the Programmatic Environmental Impact Statement (PEIS), the DOE lists 27 sites that currently store, generate, or are projected to generate LLW.<sup>5</sup> Current and projected LLW inventory data for these sites are summarized in Table 1.

**Table 1. DOE LLW Management Sites**

Site	Symbol	State	Current LLW Vol, m <sup>3</sup>	20-Yr Projected Generation, m <sup>3</sup>	Total, Current Vol + Projected, m <sup>3</sup>
Ames Laboratory	Ames	IA	26	80	110
Argonne National Laboratory - East	ANL-E	IL	880	5,800	6,700
Bettis Atomic Power Laboratory	Bettis	PA	0	12,000	12,000
Brookhaven National Laboratory	BNL	NY	560	5,080	5,600
Fermi National Accelerator Laboratory	Fermi	IL	45	1,400	1,500
Fernald Environmental Management Project	FEMP	OH	a	a	a
Hanford Site <sup>b</sup>	Hanford	WA	0	89,000	89,000
Idaho National Engineering and Environmental Laboratory	INEEL	ID	3,500	101,000	105,000
Kansas City Plant	KCP	MO	4	20	24
Knolls Atomic Power Laboratory	KAPL	NY	0	19,000	19,000
Lawrence Berkeley Laboratory	LBL	CA	53	1,200	1,300
Lawrence Livermore National Laboratory	LLNL	CA	780	2,800	3,600
Los Alamos National Laboratory	LANL	NM	0	150,000	150,000
Mound Plant	Mound	OH	1,600	37,000	38,000
Nevada Test Site	NTS	NV	270	1,400	1,700
Oak Ridge Reservation	ORR	TN	20,000	250,000	270,000
Paducah Gaseous Diffusion Plant	PGDP	KY	5,300	45,000	50,000
Pantex Plant	Pantex	TX	210	2,440	2,700
Pinellas Plant	Pinellas	FL	16	1,300	1,300
Portsmouth Gaseous Diffusion Plant	PORTS	OH	1,500	96,000	97,000
Princeton Plasma Physics Laboratory	PPPL	NJ	2	220	220
RMI Titanium Company	RMI	OH	2,500	48,000	51,000
Rocky Flats Environmental Technology Site	RFETS	CO	2,400	39,000	41,000
Sandia National Laboratories-New Mexico	SNL	NM	680	1,800	2,500
Savannah River Site	SRS	SC	11,000	500,000	510,000
Stanford Linear Accelerator Center	SLAC	CA	2,200	280	2,500
West Valley Demonstration Project	WVDP	NY	14,000	28,000	42,000

<sup>a</sup> Waste is ER waste only; no volumes provided in the Waste Management PEIS.

<sup>b</sup> Excludes LLW fraction of the Hanford Site tank wastes.

**Evaluation Criterion #2: Only sites that will remain open through 2015 will be considered.**

Public Law 99-240 requires that GTCC LLW be disposed in a facility licensed by the NRC. There is currently no facility licensed to dispose of GTCC waste. Moreover, the NRC has not issued licensing criteria for GTCC disposal. In its Congressionally-mandated response to Public Law 99-240, <sup>6</sup> the DOE estimated that it would take 8-10 years to fully implement any permanent, licensed disposal option for GTCC waste.

The earliest time that GTCC disposal could occur is optimistically estimated to be in the year 2006. However, disposal of other GTCC sealed sources (specifically, actinide bearing sealed sources) could have a higher priority than disposal of Sr-90 RTGs. Depending upon resource availability, the development of one or more licensed GTCC disposal sites for Sr-90 RTG disposal could be delayed an additional four to six years.

Given the current uncertainty in the time required to develop and license a disposal site for the Sr-90 RTGs, it is estimated that a storage facility for Sr-90 RTGs should be available to DOE through the year 2015 to provide a sufficiently conservative window for development of a licensed disposal facility. The 7 sites listed below can be eliminated from further consideration due to the fact that they are either already completely closed or will be completely closed by the end of 2015.

<u>Sites Eliminated by Criterion #2</u>	<u>Closure Date</u> <sup>7</sup>
Fernald Environmental Management Project	2008
Mound Plant	2004
Pinellas Plant	1997
Portsmouth Gaseous Diffusion Plant	2013
RMI Titanium Company	2005
Rocky Flats Environmental Technology Site	2006
West Valley Demonstration Project	2015

**Evaluation Criterion #3: Only sites that are (a) managed through the DOE Albuquerque Operations Office (DOE/AL) and/or (b) sites with an Office of Environmental Management (EM) closure date beyond 2015 in the March 2000 document, *Status Report on Paths to Closure*, <sup>7</sup> will be considered.**

DOE EM is responsible for the funding and management of GTCC LLW programs. The OSRP is managed through DOE/AL. To maintain effective institutional control and management of Sr-90 RTG storage, the storage site must be managed through DOE/AL and/or DOE EM must have management oversight responsibility for LLW at the selected storage site(s) for the duration of the storage activity (through 2015).

Sites that meet part (a) of Criterion #3 are:

Kansas City Plant (MO)  
Los Alamos National Laboratory (NM)  
Pantex Plant (TX)  
Sandia National Laboratories (NM).

The following sites meet part (b) of Criterion #3:

Hanford Site (WA)  
Idaho National Engineering and Environmental Laboratory (ID)  
Nevada Test Site (NV) <sup>8</sup>  
Oak Ridge Reservation (TN) <sup>9</sup>  
Savannah River Site (SC).

## Summary

The Waste Management PEIS lists a total of 54 DOE sites. If Evaluation Criterion #1 is applied, the list of candidate RTG storage sites is the 27 sites in Table 1. Applying Criterion #2 eliminates 7 sites, and Criterion #3 narrows the list to the 9 sites listed above. These are the sites that will be evaluated using the NEPA process.

## References

1. Leonard, Lee, Tompkins, J. Andrew, Leonard, Shelby, Pearson, M.W., McAlpin, Jerry, and Grigsby, Charles, The Off-Site Source Recovery Project at Los Alamos, LA-UR-99-6218, Los Alamos National Laboratory, Los Alamos, New Mexico, 1999.
2. OSRP Database of RTG Power Sources, Revision 3, January 19, 2000.
3. Approve National Environmental Policy Act Environmental Assessment Determination of Removal, Transportation, and Storage of Radioisotopic Thermoelectric Generators, July 10, 2000 memo from David G. Huizenga to Carolyn Huntoon, Assistant Secretary for Environmental Management, EM-1, U.S. Department of Energy. Action approved July 28, 2000.
4. Implementation Guide for Use with DOE M 453.1-1, DOE G 435.1-1, U.S. Department of Energy, July 9, 1999, chapter IV, p. IV-16.
5. Final Waste Management Programmatic Environmental Impact Statement, DOE/EIS-0200-F, U.S. Department of Energy Office of Environmental Management, May 1997, Introduction, Table 1.4-1, p. 9, and Volume I, Table 7.1-1, p. 7-3.
6. Recommendations for Management of Greater-Than-Class-C Low-Level Radioactive Waste, Report to Congress in Response to Public Law 99-240, DOE/NE-0077, U.S. Department of Energy, February 1987, p. 4-1.
7. Status Report on Paths to Closure, DOE/EM 0526, U.S. Department of Energy Office of Environmental Management, March 2000, Individual Site Summaries, <http://www.em.doe.gov/closure/fy2000/index.html>.
8. Reference 7 lists an environmental remediation closure date of 2014 for the Nevada Test Site; however, the site is scheduled to continue to dispose of LLW through 2070. (Ref 7, Individual Site Summaries, Section C.5, Nevada Operations Office Summary, p. C-5.)
9. Reference 7 lists an environmental remediation closure date of 2014 for Oak Ridge; this is when remediation activities are scheduled to be completed at the East Tennessee Technology Park (formerly K-25). However, facilities at both the Y-12 Plant and the Oak Ridge National Laboratory are scheduled to be transferred to EM for remediation and/or decontamination and decommissioning. These activities will extend EM's presence at the Oak Ridge Reservation well beyond 2014. (Conversation with Mr. Bill Seay, Oak Ridge Remediation Management Group Leader, 8/31/00.)